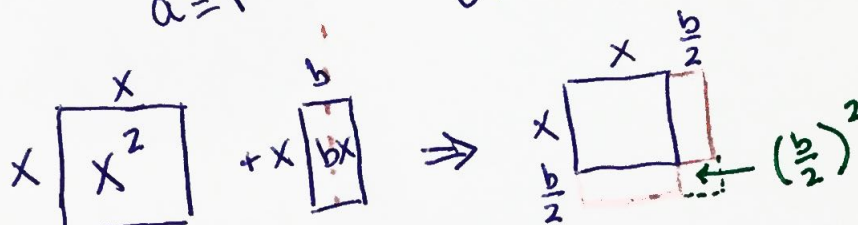


Notes - Solving by Completing the Square

⇒ Turns standard form into vertex form

⇒ Need $x^2 + bx =$
 \nearrow $a=1$ \nearrow c moved to other side

Picture



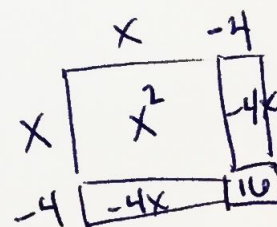
Alg Process

1. Make sure you have $x^2 + bx =$
2. Find $b/2$
3. Square $b/2$
4. Add the result to both sides of equation

$$\left(x + \frac{b}{2}\right)^2 =$$

Ex: $x^2 - 8x = -15$
 $+16 \quad +16$

$$\frac{b}{2} = \frac{-8}{2} = -4$$
$$(-4)^2 = 16$$



$$x^2 - 8x + 16 = 1$$

$$(x - 4)^2 = 1$$

$$x - 4 = \pm 1$$

$+4$ $+4$

$$x = 1 + 4 = 5$$
$$-1 + 4 = 3$$

Ex 2: $x^2 + 2x - 120 = 0$

$$x^2 + 2x = 120$$

$$x^2 + 2x + 1 = 121$$

$$(x+1)^2 = 121$$

$$x+1 = \pm 11$$

$$\frac{2}{2} = 1 \quad 1^2 = 1$$

$$x+1 = 11 \Rightarrow x = 10$$

$$x+1 = -11 \Rightarrow x = -12$$

Ex 3: $2x^2 - 3x + 1 = 0$

$$\frac{2x^2}{2} - \frac{3x}{2} = -\frac{1}{2}$$

$$x^2 - \frac{3}{2}x = -\frac{1}{2}$$

$$+ \frac{9}{16} \quad + \frac{9}{16}$$

$$x^2 - \frac{3}{2}x + \frac{9}{16} = -\frac{1 \cdot 8}{2 \cdot 8} + \frac{9}{16} = \frac{1}{16}$$

$$\sqrt{\left(x - \frac{3}{4}\right)^2} = \sqrt{\frac{1}{16}}$$

$$x - \frac{3}{4} = \pm \frac{1}{4}$$

$$+ \frac{3}{4} \quad + \frac{3}{4}$$

$$x = \frac{3}{4} + \frac{1}{4}$$

$$\textcircled{1}$$

$$x = \frac{3}{4} - \frac{1}{4} = \frac{2}{4}$$

$$\textcircled{\frac{1}{2}}$$

$$\frac{b}{2} = -\frac{3}{2} \cdot \frac{1}{2} = -\frac{3}{4}$$

$$\left(-\frac{3}{4}\right)^2 = \frac{9}{16}$$